

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ROBERT M. MOORE JR., ET AL.

APPLN. NO.: 09/785,890

CONFIRMATION NO.: 5058

FILED: FEBRUARY 16, 2001

CONTINUOUS PROCESSES FOR
PREPARING CONCENTRATED
AQUEOUS LIQUID BIOCIDAL
COMPOSITIONS

Customer No.: 65895

GROUP ART UNIT: 1616

EXAMINER: ALTON N. PRYOR

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. §1.132

Christopher J. Nalepa, Ph.D., hereby declares as follows:

1. I am a chemist employed by Albemarle Corporation, the assignee of the above-identified application by recorded assignment.
2. In 1980, I received the degree of Ph.D. in chemistry from Rice University.
3. Since 1980, I have been continuously employed as a chemist by Albemarle Corporation and the predecessor thereof, Ethyl Corporation, at the research laboratory facilities in Baton Rouge, Louisiana.
4. I am an Applicant in the above-identified application.
5. The test work described herein was conducted by me at the Albemarle Process Development Center in Baton Rouge, Louisiana.

i.

6. In the inventive run in my Declaration filed on August 4, 2009, a larger number of moles of hydroxide was employed as compared to the runs according to Goodenough et al.

(U.S. 3,558, 503). The larger number of moles of hydroxide is explained in part by the larger amount of halogen added to the inventive solution and in part by the higher pH of the inventive solution relative to the solutions prepared according to Goodenough.

ii.

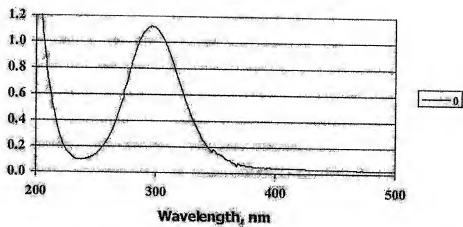
7. Having the pH of the solution at a very high value throughout the process of forming the biocidal solution, especially by adding the entire amount of base initially, provides biocidal solutions that have greater thermal stability than solutions obtained by preparations at lower basic pH values and then raising the pH to the final high pH value.

iii.

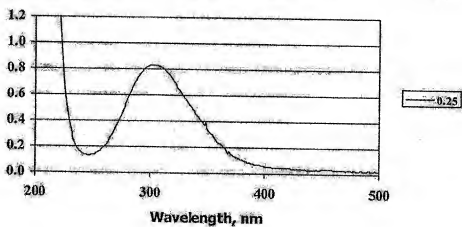
8. As described in my Declaration filed on August 4, 2009, the reaction of HOCl with Br^- to form HOBr (and Cl^-) at pH 10 by UV absorption was studied. The absorption peaks for HOCl ($\lambda_{\text{max}} = 292 \text{ nm}$) and HOBr ($\lambda_{\text{max}} = 330 \text{ nm}$) were monitored. The results are shown on the graphs below.
9. HOCl and Br^- were brought together in an aqueous solution at pH 10. The HOCl was in the form of bleach; NaBr was added to the bleach solution. The concentrations were as follows:

$$[\text{HOCl}] = [\text{Br}^-] = 0.00284 \text{ mol/L}; 201 \text{ ppm as } \text{Cl}_2; 233 \text{ ppm } \text{Br}^-$$

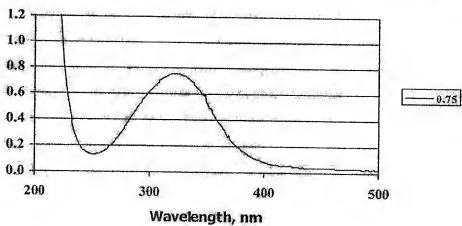
10. In the first graph below, the peak for bleach is shown prior to additions of bromide. The measurement on the bleach solution was taken before adding the bromide because of the speed of the reaction once bromide is added.
11. The remaining graphs below are from measurements taken at several time intervals during the reaction.
12. As seen by the UV absorbance scans, the reaction to form HOBr was complete in less than 5 minutes.
13. It is my considered opinion that no detectable amount of HOCl is formed from HOBr and Cl^- , based on the UV absorbance results.



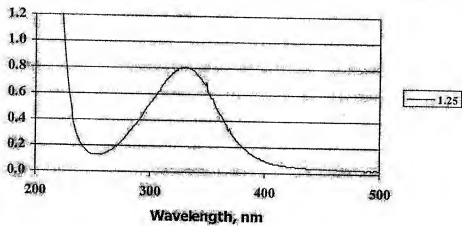
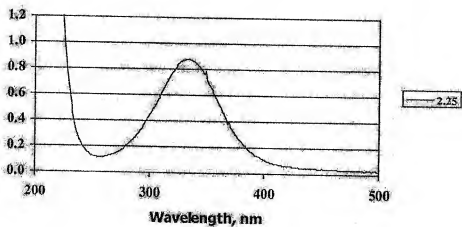
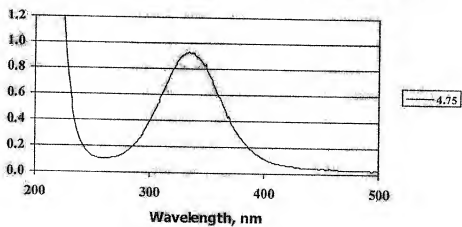
$t = 0$ (Bleach without Br⁻)



$t = 15''$



$t = 45''$

 $t = 1'15''$  $t = 2'15''$  $t = 4'45''$

14. I hereby declare that all statements made herein of my own knowledge are true and that all statement made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: August 1, 2011



Christopher J. Nalepa